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A DEFENSELESS SEA-BOARD.

Nearly twenty-two years ago (March 9, 1862), the famous naval duel between the Monitor and the Merrimac, in Hampton Roads, effected a revolution in sea-coast defense and maritime warfare. Prior to this memorable event, our system of coast fortification was as good as any in the world, and the ordnance with which our forts were armed was as heavy and as effective as that of any power in Europe; while our navy, though small, was a source of just pride, because of the perfection of its models and the construction of its vessels, and of their armament and equipment.

In the winter of 1858–59, while I was on leave of absence from the army, in Europe, I went aboard the Wabash in the harbor of Genoa. She was one of four frigates constructed about two years previously in our navy-yards,— of which the Merrimac, afterward used against us with such fatal effect, was another, — and was the flag-ship of the Mediterranean squadron. I can never forget the emotions of pride that surged up to my very throat on pacing her deck and contrasting her with the war-vessels of other powers, of which there were several in port. She was the gem of the harbor; in power, speed, grace, and beauty the superior of everything that rode the waves of the Mediterranean at that time.

On my subsequent visits abroad, in 1869 and again in 1870, the change in our naval status relatively to other powers was painfully marked. It was notably lower, though foreign naval architecture and armament were very far from having attained the stage of perfection which they have now reached; and the military and naval prestige we had gained during our protracted civil war was still comparatively fresh. After a more recent residence of a few years in Europe, whence I returned in 1881, I am compelled to say that now the condition of our navy and the estimates made of its efficiency by foreign officers are most humiliating to the national pride.

By many of the younger officers in foreign naval services,—the indiscreet Hotspurs who rashly give vent to their uppermost thoughts,—a hostile demonstration of armored ships along our sea-board is hoped for, in the belief that it would turn out a sort of holiday excursion, accompanied by some glory, cheaply earned, and followed by unexampled prize-money. Laying the western Atlantic coast under tribute is a day-dream of many an embryo Peterborough and Paul Jones. And what is there to prevent its realization?

The diffuseness of official reports, and frequently their dry elaboration of detail rendered necessary by the requirements of official routine, often deter the general public from a careful examination of them; and the warnings and remonstrances of the ablest and most experienced officers of our army and navy, whose duties have specially led them to the consideration of this subject, remain practically unheeded. All appropriations by Congress for our sea-coast defenses have been limited, during the past eight years, to the protection, preservation, and repair of our obsolete and now utterly inefficient fortifications. Indeed, this has been the case practically since 1865. While large sums have been voted and expended for the improvement of harbors without commerce, and of streams which no expenditure of money could make available for commercial navigation, the harbor defenses of our great sea-port cities, where the commerce of the entire country is chiefly centered, have been shamefully neglected.

After the absolute impotence of wooden walls to resist iron walls had been conclusively demonstrated by the operations of the Merrimac in Hampton Roads, and the brilliant action between the Monitor and herself had revealed the capabilities and possibilities of this new system of naval warfare, Great Britain at once proceeded to meet the new and startling exigencies developed, and appropriated £8,000,000 for the defense of its most important harbors. Since then it has expended, in addition, not less than £20,000,000 for armored ships and rifled ordnance, and in experimental tests of guns and projectiles of the greatest crushing and penetrating energy attainable, and of armor-plates capable of withstanding the impact of these ponderous projectiles (the densest and largest being of compressed steel and weighing 2110 lbs.), impelled by charges of powder so immense as to surpass the wildest dreams of the artillerists of twenty years ago.

The extreme test of heavy guns fired with enormous powder-charges was made by the Italian Government in 1882, at Spezzia. An Armstrong breech-loading, rifled 100-ton gun, caliber 17¾ inches and 33 feet length of bore, was fired with a charge of 776 lbs. of powder, giving the projectile, which weighed 2000 lbs., an initial velocity of 1832 feet a second and an initial energy of 46,580 foot-tons. This tremendous result is certainly exceptional, and the charge of powder employed to accomplish it equally so; but charges of a quarter of a ton of powder are common for this immense gun, and give the projectile a velocity of more than a thousand feet a second at the distance of over five miles.

When these, and similar results of the new rifled ordnance of smaller caliber are contrasted with the old ordnance of our fortifications along the sea-board, and attention is directed to the fact that these fortifications — which were planned and constructed to resist the ordnance of twenty-five years ago — have not been essentially modified nor materially strengthened, the defenselessness of our sea-ports will be plainly manifest.

The protection of our cities and ports necessarily depends upon the ability of our navy and our sea-coast and harbor defenses to resist successfully the approach and entrance to our harbors of any fleet that a hostile power may be able to concentrate for the purpose. Our navy is in no condition to operate along the coast outside, in the open sea, with the slightest effectiveness against such fleets as half a dozen naval powers could easily put in motion against us. Its sphere would necessarily be limited chiefly to operations within our principal harbors, in conjunction with our sea-coast fortifications, batteries, and other land defenses.

In a report to the Secretary of the Navy, during the last Congress, Admiral Porter remarks:

> "Our entire system of arming ships must be changed, if we expect the navy to be of any service in case of war with a foreign power.
>
> "It is of little use to build ships when we are without guns of proper caliber to mount on them.
>
> "We possess no government workshops of sufficient magnitude to supply even the small navy we have at present with large guns.

> "The indifference of our government to this matter of arming our ports and ships must strike other nations with astonishment. It looks as if we supposed ourselves exempt from the dangers of war which beset them. A few converted rifle guns have been placed upon our principal ports, but nothing of a character that would keep a single powerful iron-clad from passing them in broad daylight, to say nothing of a night passage, which could be made with wooden vessels, so far as the forts are concerned. An enemy could come on our coast to-morrow, and, commencing in Maine, could take possession of every harbor as far as Texas. Our poor little wooden vessels would have to run away for safety, and our old quasi iron-clads would, with their present armament, be more than useless. The enemy would sink them as worthless, after he had obtained possession."

In reference to torpedoes, Admiral Porter says:

> "An insane idea seems to prevail that we can do without guns and ships, and that our harbors can be protected by torpedoes. There might be something in such an argument if we had ports that could keep out an enemy's fleet; but the party that can command the best iron-clads and the heaviest ordnance will win."

On this subject, the following is extracted from the Report of the Secretary of the Navy:

> "Our total lack of a really efficient armament is well known to Congress, and has been represented in the successive reports to Congress for several years. Our vessels of war are obliged to appear at great disadvantage beside those of an ostensibly equal force belonging to other nations, and our battery power is so low as to justify the gravest apprehension in case we should be called upon to meet foreign ships of equal size in battle."

Of torpedoes, the Secretary writes:

> "Torpedoes, either for defense or attack, must be covered and defended by the fire of powerful rifled guns, both afloat and ashore. . . . The two destructive agents (artillery and torpedoes) supplement each other, and as a rule must be employed together."

Subsequently to the submission of the foregoing reports to Congress, that body authorized the construction of three steel unarmored war-vessels and one dispatch-boat, and appropriated a sum of money for the purpose, under the act making appropriations for the naval service for the fiscal year 1884, as follows:

> "For the construction of the steel cruiser of not less than 4300 tons displacement, now specially authorized by law, two steel cruisers of not more than 3000 nor less than 2500 tons displacement each, and one dispatch-boat, as recommended by the Naval Advisory Board, in its report

of December 20, 1882, $1,300,000; and for the construction of all which vessels, except their armament, the Secretary of the Navy shall invite proposals from all American ship-builders whose ship-yards are fully equipped for building or repairing iron and steel steam-ships, and constructors of marine engines, machinery, and boilers; and the Secretary of the Navy is authorized to construct said vessels and procure their armament at a total cost for each not exceeding the amounts estimated by the Naval Advisory Board in said report, said vessels to be built by and under contracts with the lowest and best responsible bidder or bidders, made after at least sixty days' advertisement published in five of the leading newspapers of the United States, inviting proposals for constructing said vessels, subject to all such rules, regulations, superintendence, and provisions as to bonds and security for the due completion of the work as the Secretary of the Navy shall prescribe; and no such vessel shall be accepted unless completed in strict conformity with the contract, with the advice and assistance of the Naval Advisory Board, and in all respects in accordance with the provisions of the act of August 5, 1882, except as they are hereby modified; and the authority to construct the same shall take effect at once; and the Secretary of the Navy may, in addition to the appropriation hereby made, apply to the constructing and finishing of the vessels in this clause referred to any balance of the appropriation made to the Bureaus of Construction and Repair and Steam-Engineering for the current fiscal year or in the present act which may remain available for that purpose: Provided, that he shall utilize the national navy-yards, with the machinery, tools, and appliances belonging to the government there in use; in the building of said ships, or any parts thereof, as fully and to as great an extent as the same can be done with advantage to the government."

In his last annual report (November, 1883,) to the Secretary of the Navy, Admiral Porter, referring to the vessels authorized by the preceding Congress, whose construction had been begun, censures the plan of their construction, on the ground that they are to be insufficiently sparred and rigged, and cannot carry enough canvas to enable them to make fair speed independently of their engines. He calls attention to the fact that coal has been made contraband of war by the European powers, which would greatly detract from the service qualities of these vessels in time of war, as we are without proper coaling stations outside of our own boundaries. He infers that such fleet passenger steamers as the Alaska and the Oregon, mounted with a few powerful guns, would be very formidable in war as commerce-destroyers, especially for powers possessing coaling stations at various points remote from their place of departure. He says:

"If Spain, the least formidable of maritime nations, went to war with us to-morrow, she would sweep our gradually increasing commerce from the ocean by setting afloat the large, swift steamers she could buy in Europe; and

> we could not prevent it. Our vaunted 'home squadron,' and the six tugs which one of our statesmen declared a great auxiliary to our naval force, would retire under Sandy Hook or the friendly guns of Fortress Monroe, and be obliged to look quietly on while we were being despoiled, unless they chose to add to the laurels of the despoiler by offering themselves up as a sacrifice to satisfy public sentiment."

The Secretary of the Navy, in his recent annual report, takes a more cheerful view of the prospective service qualities of the cruisers under construction, authorized by the last Congress during its last session. Of the largest of the cruisers authorized, he says:

> "The Chicago is an example of the largest unarmored cruising and fighting vessels now built, and will have no superior in the world in the combination of speed, endurance, and armament."

But a writer in a late number of the London "Engineer" criticises the design of the Chicago in a scathing way, and evidently is of a very different opinion from the Secretary in reference to her sea-going and fighting qualities. He says:

> "In the design of the cruiser Chicago, an English engineer and naval architect will find at every turn something defective. It is not easy to see for what she is intended; against iron-clads she would be helpless. It is difficult to understand what purpose the inch-and-a-half steel deck is to serve; it is too thick for a deck, and too thin for defense. There is no manner of protection provided for the men, save trumpery shields on the guns. There is good reason for doubting if the Chicago can ever be a fast vessel. Her engines are revivals of devices long since obsolete, and all the vices of American marine engineering manifest themselves. No English engineer in his senses would dream of putting in compound beam engines to drive twin screws. Defective as the engines are, they are admirable when compared to the boilers. To go to sea with such boilers is simply to court destruction."

What may be the truth of this harsh criticism, I am unable to judge; but it is a fact that the Chicago is not intended, and is not available, for harbor or sea-coast defense against iron-clads, and consequently she contributes nothing toward the solution of the present problem. She and her smaller consorts may prove valuable cruisers in the open seas, and excellent commerce-destroyers, but that is all for which they are likely to prove of service, and other means of harbor defense must be resorted to, if we are to hope for reasonable immunity from the seizure and spoliation of our centers of commerce in the event of war.

Manifestly, our chief dependence must be upon some adequate system of land sea-coast defense—upon our fortifications and shore batteries mounted with the most powerful improved modern ordnance, and our torpedoes connected by galleries with electrical operating rooms and magazines on shore, all protected and under cover of the fire from the forts or batteries.

One more quotation from the latest report of Admiral Porter, and I have done with the navy.

> "What a pitiable exhibit for a country like this is the report of the Chief of Engineers of the Army, who states that there is not one of our ports that has any defense against even an enemy of very inferior character. I know this to be the case, from my own observation, for there is not a harbor in the country where an ordinary iron-clad cannot pass the batteries, choosing their own time for so doing. So it appears that our army defenses are in the same category as those of our navy. It is therefore indispensable that both should forthwith take a new departure, to insure that effectual protection to our countrymen which they have a right to demand. . . . When I speak of our unprotected coast, I refer to our lake coast, as well. In case of war between Great Britain and the United States, it would be comparatively easy for the former to get possession of all the lakes, and with her powerful navy lay our cities under contribution or destroy them. For this reason we should pay proper attention to our defenses on the shores of the great lakes. The dangers threatened here appeal directly to our representatives from the West."

All the military evidence goes to show that, with the exception of our torpedo system, upon which our military authorities, though with the greatest misgivings, place their chief reliance, we have absolutely no substantial defense for our great seaports.

As the channel to a commercial port must be open to permit the passage of our own vessels, sunken torpedoes, to be exploded by contact, cannot be used; they would prove as destructive to ourselves as to an enemy, and hence mines and torpedoes to be discharged from the shore by an electrical current are necessary. Magazines, operating points, etc., on shore, connected by galleries, are indispensable, and these must be defended and covered by the forts and shore batteries; otherwise, the magazines would fall into the hands of the enemy, or be destroyed, and the communications demolished or rendered unavailable Experienced and able officers of the army who have made the subject a study, have repeatedly, year after year, for more than a dozen years, drawn attention to the imperfections of our sea-coast defenses and their practical uselessness, without making any impression upon Congress. Military men of every foreign service concede that the engineer corps of our army embraces as much theoretical knowledge as that of any army in the world, and its officers are esteemed the peers, in character, ability, and professional attainment, of those of any engineer service in Europe. While the practical experience of its officers has been necessarily restricted, because of the stringent economy of Congress in this direction, the officers of this corps have, so far as the funds at its disposal for such purposes, as well as those at the disposal of the Ordnance Department would allow, carefully experimented and reported upon such modifications and improvements in our fortifications and their armament as they deemed necessary.

A Board of Engineers for Fortifications, etc., has been established by the War Department, of which General Tower was, and General Newton is, president (the former having retired from service), with offices in New York City. General Abbot, under whose command is the Engineer School of Application at Willet's Point, is also a member of the Board, and has special direction of the torpedo service of the army.

Lieutenant Bixby, of the Corps of Engineers, who was on duty in France, engaged in the study of special summer engineering connected with the course of the École des Ponts et Chaussées, was detached from that service and instructed to obtain all the information possible as to the best system of making iron and steel plates for armor, the best system of rifled breech-loading ordnance, as well as the best system of sea-coast defense in Europe. Though he met with scant courtesy from Krupp, he was enabled to gain some useful information, and reported the same to his chief. His report, dated September 29, 1882, concludes thus:

> "As a result of my journey, I have found that within the last few years some radical changes have been or are being effected in sea-coast fortifications and their armament; and such new features as presented themselves were carefully examined by me during my trip. Prominent amongst these changes are: The rapidly increasing and almost exclusive use of chilled cast-iron for armor defense on the continent, as contrasted with that of wrought iron or steel-faced wrought iron in Great Britain; the increasing weight and the alteration of form of turrets and turret machinery; the use of inclined or curved metal glacis, or barbettes; the rejection of steel facing for glacis armor; the unanimous adoption of breech-loading mechanism for heavy guns; the reduction of embrasure ports to an almost absolute minimum, and the consequent use of muzzle-pointing-gun gun-carriages; the

radical modifications in the shape and mechanism of such carriages; the possibility of an almost absolute non-recoil and no-embrasure eight-inch gun, completely masked, and firing with great accuracy and rapidity; the rapidly increasing use of hydraulic and automatic machinery for heavy guns and for their carriages; the almost entire rejection of open embrasures in barbettes; the increasing dislike to the use of Moncrieff and other similar too expensive and too complicated disappearing-gun gun-carriages; the increasing use of indirect fire from behind covering parapets; the importance now assigned to the use of the modern rifle mortar-howitzer, and the increasing accuracy and value of its fire; new modifications in the shape and material of projectiles, such as seem to point toward an increase of penetrating power; and, finally, the discovery of new explosives, which appear to be safer, more powerful, and more rapid in their effect, than either dynamite or nitro-glycerine."

A "Board on Heavy Ordnance and Projectiles" was constituted by the War Department in 1881, and met in New York City in July. Two officers of artillery, two of ordnance, and one of engineers constituted the Board, of which General Getty was president. From their report, made May 18, 1882, the inference may be drawn that there are no facilities in this country for the production or manufacture of ordnance and projectiles capable of giving as good results as the modern breech-loading rifled ordnance of the principal works and foundries of Europe.

To return to the evidence of the defenseless condition of our sea-ports, in a recent report the Chief of Engineers of the Army, General H. G. Wright, says:

> "The casemated works, of which our sea-coast defenses are necessarily largely composed, were built when wooden walls were the only protection of guns afloat. Now, ships of war are clad in armor up to two feet in thickness, and the old smooth-bore guns have been replaced by rifled guns, the largest of which throw shot of nearly a ton's weight, and which burn at each discharge nearly a quarter of a ton of powder. While other maritime nations are adding to their already powerful navies heavily armored ships of war, which are armed with 81 and 100 ton guns, and which cost, exclusive of their armament, more than two and a half millions of dollars, they are building armored defenses for their own coasts. Great Britain has already more than five hundred guns in position behind armored defenses. We have not one such gun, nor have we any armored defenses whatever."

General Quincy A. Gillmore, whose reputation as a scientific military engineer is of the highest, in a late report upon the harbor defenses in his charge, embracing the Atlantic sea-board from New York to Florida, remarks:

> "The published records of our War Department for the last dozen years show with great force and clearness that we not only possess no guns capable of making a good defense against a modern fleet, but that if we had

the guns we have no places in readiness to receive them where they could be effectively used against armored vessels firing small missiles and case-shot at suitable ranges.

"In other words, before we can hope to repel the attacks of war vessels of recent type, not only will the artillery for our forts have to be procured, but the forts themselves will need to be built, or the existing forts greatly modified.

"This statement is so entirely true with respect to the most valuable of our positions on the sea-board, that they may very properly be regarded as wholly destitute of protection, that which has been provided for them by the stringent economies of Congress being of little, if any, account."

Referring to the accessibility of our harbors to the iron-clad ships of European navies, General Gillmore says:

"There are more than a dozen fine harbors on our Atlantic coast—Portland, Portsmouth, Boston, Newport, and Hampton Roads being among the number—that are easily accessible to the largest war vessels hitherto constructed or contemplated. There are more than half a dozen other harbors—among which may be specified New Bedford, New London, New York, and Key West—into which a few of the deepest men-of-war cannot enter. But there is not one of them that does not possess ample depth to pass half the armored cruisers of Great Britain, including vessels armed with the 38-ton and 81-ton guns; all the German armored vessels except one; more than two-thirds of those of the Italian navy; all belonging to the Russian navy except two; all belonging to the Austrian navy except three; all belonging to Holland and Turkey without exception; and a large proportion of those belonging to the French and Spanish navies.

"The aggregate population clustered about these twenty harbors for armored vessels is nearly 3,000,000, while the value of public and private property within easy and destructive range of a hostile fleet cannot be far short of $2,000,000,000. The losses that might be inflicted in a few hours, in their present unprotected condition, would exceed more than ten-fold the entire cost of suitable permanent defenses for the whole country. . . . It appears, therefore, that our entire Atlantic and Gulf sea-coast, from Maine to Texas, is peculiarly at the mercy of a hostile naval power, and that our largest centers of population, commerce, and manufactures, where the greatest values are accumulated, and hence where the greatest temptations are offered and the greatest injury could be inflicted in the briefest interval of time, are within easy reach of the most destructive engines of war born of modern invention and science. The condition of the Pacific coast is equally defenseless."

Detailed reports from Colonels Macomb, Craighill, and other officers of the Engineer Corps, to the Chief of Engineers, say that the defenses of Philadelphia, Baltimore, and other sea-port cities, are utterly incapable of resisting the attacks of the new iron-clad ships armed with the latest improved heavy ordnance.

The same is true of Washington, Charleston, New Orleans, San Francisco, and other cities.

In reference to the lake frontier, the Board of Engineers on Fortifications, etc., report:

> "The defenses for the lake frontier, so far as constructed, have been applied only to certain places on Lakes Ontario and Erie, to the Detroit River, and to the outlet of Lake Champlain. All of these, with the exception of the last named, were constructed of the simplest form, sufficient merely to resist a sudden assault, and armed only with a barbette tier of guns to meet attacks from a naval force.
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> "Naval supremacy has always been regarded as a necessity for protection to our commerce on these waters and to the large cities contiguous to the shores, such as Chicago, Milwaukee, Cleveland, Erie, Buffalo, Oswego, and others. There are peculiar circumstances affecting the relative chances of England and the United States acquiring at the outbreak of hostilities a naval supremacy upon the lakes. By treaty stipulations, both powers are equally enjoined during peace against keeping afloat more than a trifling number of guns; but in other respects the advantage would be largely in favor of England; for while the United States, at the commencement of a war, would require time to build and launch a fleet upon these waters, the former power might be enabled to send gunboats previously prepared into Lake Ontario by the Saint Lawrence canals, and thence into Lake Erie by the Welland Canal. By these means the United States might be anticipated, and its commerce on the lakes paralyzed or destroyed, and its cities laid under contribution. In this view, it is well to note that the Canadian authorities have been for a long period past, and are still engaged in, enlarging and deepening the canal systems which surmount the Saint Lawrence rapids and connect Lakes Ontario and Erie. To prevent the use of these canals for hostile purposes, it would be necessary to block the passage of the Saint Lawrence by heavy batteries, as also to seize and hold the Welland Canal, or else destroy locks so as to render the canals unserviceable."

From the stand-point of the department which has the entire system of sea-coast defense in its especial charge, the following, from the report of General Wright, Chief of Engineers of the Army, admirably summed up the subject last year:

> "With old casemated works (than which there were none better in their day) designed long before the introduction of the 800 to 2000 pounder rifled guns into modern warfare; their walls pierced for guns long since out of date; without iron armor or shields, and but partially armed even with the old ordnance; with old earth-works, some of them built in the last century; with new ones for modern guns and mortars but partially built and rapidly being destroyed by the elements by reason of their incompletion; with gun-batteries without guns, and mortar-batteries without mortars; with no carriages whatever for barbette guns of large size, except such as require the cannoniers to load from the tops of parapets, from which they

> can be picked off in detail by the enemy's sharpshooters; with an excellent defensive torpedo system developed at our torpedo school at Willet's Point, but only partially carried into effect; with but a very small number of our works prepared with the torpedo casemates and galleries necessary for securing the electrical apparatus from the enemy's fire, and for conducting the electric wires to the torpedo lines which must be laid when the day of trial comes; and with less than 200 engineer soldiers educated for torpedo and other engineer service, instead of the 752 men now authorized by law; and of whom not less than 520 ought to be ready to supply the detachments required for torpedo service in our fortified harbors,—we can make but a feeble defense against the powerful fleets now prepared and rapidly increasing, which will sooner or later be brought against us by some of the most powerful maritime nations on the earth, or by others nearer at hand, whose offensive naval means exceed our own, and whose powers are not to be despised."

This year, with trenchant satire (probably unintentional, and perhaps unconscious), in his latest annual report to the Secretary of War, dated October 13, 1883, Gen. Wright reports, respecting "Sea-coast and Lake frontier defenses," as follows:

> "During the year, operations have been restricted to those necessary for the preservation and repair of existing works. No appropriations for new works, nor for the modification of existing ones, have been made during the past eight years, and to-day the permanent fortifications of the country are in the incomplete condition in which they were left when operations were suspended in 1876, and are rapidly deteriorating for lack of funds to complete them."

The foregoing evidence of our critical condition in the event of war would seem to be conclusive, and should procure prompt remedies; but as this, or evidence of like effect, has been for years iterated and reiterated, until it would seem that Congress had been entirely deafened by it, without producing the smallest beneficial result, an appeal to the country at large seems necessary. My own personal service at sea-coast and lake posts—as Fort McHenry, Md., Fortress Monroe, Va., Fort Pickens, Fla., Forts Hamilton and Lafayette, New York Harbor, and Forts Brady and Mackinac on the lake frontier—enables me to add my testimony to that of the officers upon whom the construction and alterations of the forts devolve.

A slight reference to the latest notable addition to the Italian fleet will give a conception of the immense superiority possessed by the navies of foreign powers over anything which we can oppose to them in defense. Premising that the 100-ton and 81-ton guns can send their projectiles with sufficient force to penetrate and traverse any fortification or ship over which our flag floats, and that we have no ordnance that can make a serious impression on the walls of many iron-clads armed with these guns,—the facility with which a ship like the English Inflexible, of 11,880 tons and 8010 horse-power, armed with 81-ton rifled guns, or the English Alexandra of 9490 tons and 8610 horse-power, similarly armed (to say nothing of numerous other English and Italian iron-clads of from 6000 to 10,000 tons and from 5000 to 7500 horse-power), could enter Portland or Boston harbor uninjured, may be readily inferred.

The Lepanto, which was launched last spring, was altogether constructed in the Italian navy-yards, and is apparently the most formidable iron-clad afloat. She is of about 18,000 horse-power, and 14,000 tons, with a promised speed of seventeen knots (more than nineteen English miles) an hour. Her armament, to consist of four 100-ton turret guns and a number of smaller broadside guns, all rifled and breech-loading, will give her the greatest battery-power of any vessel afloat; while the tests made upon her armor by repeated experiment show that her turrets and sides above the line of flotation are practically impenetrable. When such a power as Italy, so recently united, and with resources so inferior to those of our own country, can make such strides toward naval supremacy and sea-port defense as she has during the past twenty years, it is a burning shame that we should be content with the practically defenseless condition of our great sea-ports.

Experiments are comparatively unnecessary. The nations of Europe have been vying with each other to obtain the most destructive ordnance and the best defenses, and have apparently reached a point where much further progress is impossible,—at least, for years to come, or until some new projectile force is discovered or some resisting substance invented stronger than iron or steel. We may take advantage of their position, and start from the point they have reached. But at present the appropriations made by Congress are barely sufficient to keep our old-fashioned fortifications from falling about the ears of their garrisons, or our obsolete old naval hulks from rotting in their docks or foundering over their anchors.

H. A. SMALLEY.